Single Ball Bounce Lab

- Lowest ΔE → golf ball
- Highest ΔE →

$$W = \Delta E$$

$$= m a_g (h_f - h_i)$$

QUIZ Tomorrow!

- Work
- Work-Energy Theorem
- Conservation of Energy
- Equations:

$$W = F \Delta \cos\theta$$

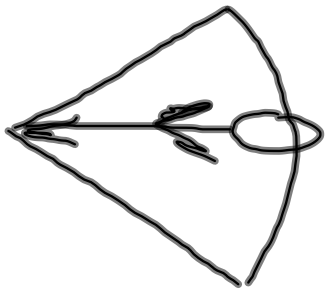
$$W = \Delta E = (K_f - K_i) + (U_{gf} - U_{gi})$$

$$K = \frac{1}{2} m v^2$$

$$U_g = m g h$$

$$K_i + U_{gi} = K_f + U_{gf}$$

An average force of 587.5 N is exerted as the Coyote stretches the string back on a giant bow. The string is moved back a distance of 0.744 m as he inserts his body in the bow. His mass is 14.57 kg, and it takes him 3.0 s to do this task. He points himself in a horizontal direction, and when the Road Runner passes he takes off from the bow. How fast is he going at his maximum horizontal velocity?



$W = \Delta E$

$= (K_f - K_i) + (U_{gf} - U_{gi})$

$\leftarrow 0.744\,m \rightarrow$

$\rightarrow \vec{F}$

$\rightarrow \vec{d}$ $\theta = 0°$

$F d \cos\theta = \frac{1}{2} m v_f^2$

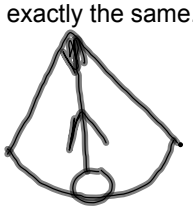
$v_f = \sqrt{\frac{2Fd}{m}}$

$= \sqrt{\frac{2(587.5\,N)(.744\,m)}{(14.57\,kg)}}$

$= 7.75\,m/s$

Work and Energy Practice Problems 4th Block 10.25.11

Failing to capture the Road Runner on his last attempt, the Coyote uses the same bow again. The only difference this time is that he starts from a cliff 34.0 m high and points the bow/himself straight down. All other data is exactly the same. In this situation, how fast will he be moving as he hits the ground?



.744 m

0 m

34 m

0 m

$W = \Delta E$

$= (K_f - K_i) + (U_{gf} - U_{gi})$

$F d \cos\theta = \frac{1}{2}mv_f^2 - mgh_i$

$v_f = \sqrt{\frac{2}{m}[Fd + mgh_i]}$

$= \sqrt{\frac{2}{(14.57\ kg)}[(587.5\ N)(.744\ m) + (14.57\ kg)(9.8\ m/s^2)(.744\ m)]}$

$= 8.64\ m/s$

this velocity is now our v_i in conservation of energy

$K_i + U_{gi} = K_f + U_{gf}$

$\frac{1}{2}mv_i^2 + mgh_i = \frac{1}{2}mv_f^2$

$v_f = \sqrt{v_i^2 + 2gh_i}$

$= \sqrt{(8.64\ m/s)^2 + 2(9.8\ m/s^2)(34\ m)}$

$= 27.2\ m/s$

$W = \Delta E$

$F d \cancel{\cos\theta^{1}} = (K_f - \cancel{K_i^{0}}) + (\cancel{U_{gf}^{0}} - U_{gi})$

$F d = \frac{1}{2} m v_f^2 - m a_g h_i$

$v_f = \sqrt{\frac{2}{m}\left[F d + m a_g h_i\right]}$

$h_i = 34.744\ m$

$d = .744\ m$

$= \sqrt{\frac{2}{(14.57\ kg)}\left[(587.5\ N)(.744\ m) + (14.57\ kg)(9.8\ m/s^2)(34.744\ m)\right]}$

$F = 587.5\ N$

$m = 14.57\ kg$

$= 27.2\ m/s$